

The discoverers suggest that the hypothesis of stellar variability, which best seems to explain this light curve, is that which involves two bright bodies revolving at a small distance round their centre of gravity, the plane of revolution being nearly in the line of sight. It will be interesting, therefore, to examine this variable spectroscopically and see whether the spectrum changes and if so in what manner.

WILLIAM J. S. LOCKYER.

NOTES.

THE French Congress of Scientific Societies will hold its forty-first annual meeting at Bordeaux on April 14-18.

THE deaths are announced of Prof. C. Dufour, professor of astronomy at the University of Lausanne, and of Prof. René Mamert, professor of chemistry at the University of Freiberg.

It is announced in *Science* that Prof. George B. Shattuck, professor of physiographic geology of the Johns Hopkins University, has been authorised to organise an expedition for a systematic scientific survey of the Bahama Islands.

THE executive committee of the Carnegie Institution has approved a grant of 300*l.* to Mr. G. R. Wieland, of the Yale University Museum, for the continuation during the year 1903 of his researches on the structure of the living and fossil cycads.

PROF. J. B. TINGLE, professor of chemistry at Illinois College, Jacksonville, Ill., has received a grant of 100*l.* from the Carnegie Institution to enable him to continue his investigations of derivatives of camphor and allied compounds.

THE Academy of Sciences at Berlin has made grants of 200*l.* to Prof. Landolt and of 150*l.* to Dr. Marckwald, both of Berlin, for work in chemistry; of 100*l.* to Dr. Danneberg, of Aachen, for work in mineralogy; and of 80*l.* to Prof. Kobert, of Rostock, for work in pharmacology.

THE council of the Iron and Steel Institute has resolved to award the Bessemer gold medal for this year to Sir James Kitson, M.P., past-president, in recognition of his great services to the iron and steel industry of Great Britain. The presentation of the medal will be made by Mr. Andrew Carnegie at the annual meeting on May 7.

THE Paris Natural History Museum has received a gift of an important collection of Lepidoptera, containing about twenty thousand specimens, from M. E. Boulet. The donor desires that his collection be incorporated with the specimens already possessed by the Museum, so that in this way a series worthy of the Paris museum may be formed.

THE Lucy Wharton Drexel medal of the University of Pennsylvania has been presented to Prof. F. W. Putnam. The medal was established four years ago, but no awards were made until this year, when four were awarded at one time, the other recipients being Prof. Petrie, for his work at Abydos; Dr. Evans, for his excavations at Crete; and Prof. Hilprecht, for work in Babylonia.

WE learn from *Science* that the Bill creating a department of commerce in the United States, with a secretary in the Cabinet, has passed the House and Senate. The new department will include, with other departments, the Lighthouse Board, the Lighthouse Establishment, the Bureau of Navigation, the Bureau of Standards, the Coast and Geodetic Survey and the Bureau of Foreign Commerce (now in the Department of State).

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It was reported last week that Vesuvius was in eruption. The following messages have since been received:—Wednesday, March 11.—Eruption increased in intensity. Huge columns of vapour emitted from the crater with blocks of incandescent lava. Friday, March 13.—Eruption continues, but with decreased intensity. Two rents have opened in the central crater, and from these molten lava and pumice are ejected at half-minute intervals. The bombs are sometimes thrown to a height of 1000 feet.

A DIVISION OF HYDROLOGY has recently been added to the Hydrographic Branch of the United States Geological Survey. The work of the division will include the gathering and filing of well records of all kinds, the study of artesian and other problems relating to underground waters, and the investigation of the stratigraphy of the water-bearing and associated rocks. In addition to the gathering of statistics relating to the flow, cost, &c., of the wells, it is hoped in the future to give especial attention to the geological features which govern, or which are related in any way to, the supply of water.

M. BIALYNITSKY-BIROULIN, the zoologist of Baron Toll's Arctic expedition, has stated to the Irkutsk branch of the Russian Imperial Geographical Society that Baron Toll left the yacht *Sarja* on June 9 on the islands of the north coast and proceeded to Cape Wyssoki, where he arrived on July 10. Here he deposited a statement to the effect that all was well with him and his followers, and that the dogs were in good condition. Baron Toll started for Bennett Land on July 13 with three sleighs and forty-five dogs. If a passage through the ice to the *Sarja* should not be open, M. Biroulin says that Baron Toll intended wintering in Bennett Land.

THE fourth annual general meeting of the National Association for the Prevention of Consumption and other forms of tuberculosis was held on Tuesday. Lord Derby occupied the chair, and in moving the adoption of the report, he referred to the interest which was taken by foreign countries through communication with the association in connection with the International Bureau. The report showed that the death rate from tuberculosis in Prussia had decreased since 1886, and, although a decrease had occurred in England, and the death rate was still lower than that of Germany, the decrease had not been so great as that in Prussia. The council expressed the opinion that the greater drop in the death rate from tuberculosis in Prussia was due to the widespread knowledge of tuberculosis, the preventive measures taken in that country, and the large number of sanatoria established during recent years. In Germany the individual was taken care of, and was watched by the State through all periods of the existence of the disease.

A REUTER telegram from Vienna states that Prof. Hanos Molisch, of Prague, "has reported to the Vienna Academy of Sciences the discovery of a lamp lighted by means of bacteria." It will be remembered that, at the Royal Society conversazione in May, 1901, Mr. J. E. Barnard and Dr. Allan Macfadyen exhibited several striking experiments with luminous bacteria from the bacteriological laboratory of the Jenner Institute of Preventive Medicine. A year ago (April 10, 1902) Mr. Barnard contributed an account of luminous bacteria to these columns, and his remarks were illustrated by reproductions of cultures of these organisms. Prof. Molisch's lamp would seem to offer another instance of the industrial application of the results of research in pure science. According to the Reuter message, "the lamp consists of a glass vessel, in which a lining of saltpetre and gelatine inoculated with bacteria is placed. Two days

after inoculation the vessel becomes illuminated with a wonderful bluish-green light, caused by the innumerable bacteria which have developed in the time. The light will burn brilliantly for from two to three weeks afterwards, diminishing in brightness."

THE following annual awards have been decided by the council of the Royal Geographical Society, and the King, as patron, has approved of the award of the two Royal medals. The founder's medal to Mr. Douglas W. Freshfield, for his explorations in the Caucasus and the Himalaya, and for his persistent efforts to extend the scope and raise the standard of geographical education.—The other Royal medal to Captain Otto Sverdrup, the leader of the *Fram* expedition, extending over a period of four years, which has done much to complete our knowledge of the geography of the Arctic regions. Captain Sverdrup was captain of the *Fram* during Dr. Nansen's great expedition, and assumed command when Nansen left the ship.—The Victoria medal for geographical research to Dr. Sven Hedin.—The Murchison grant to Mr. Isaachsen, a lieutenant in the Norwegian army, who accompanied Captain Sverdrup on his last expedition.—The Gill memorial to Mr. Ellsworth Huntington, an American traveller, for his journey through the Great Cañon of the Euphrates River, during which he made valuable observations in physical geography.—The Back grant to Dr. W. G. Smith, of Yorkshire College, Leeds, for his investigations into the geographical distribution of vegetation in Yorkshire, embodied in maps and a paper which will shortly be published.—The Peek grant to Major Burdon, who has compiled a number of excellent route maps as the result of his journeys in Northern Nigeria.

WE have received a paper on "A Scale of Interference Colours," by M. Camille Craft, reprinted from the *Bulletin de l'Académie des Sciences de Cracovie*. The object of the author was to examine the interference colours produced by thin films, and to observe the positions and breadths of the black bands in the spectra of these colours. A Biot's compensator was employed, composed of three quartz plates cut parallel to the axis, two plates being slightly wedge-shaped so that the thickness could be adjusted within considerable limits. The plates were immersed in essence of anise, which has a refractive index nearly equal to that of quartz, and the light traversing the compensator was polarised and analysed by means of Nicols. Spectra of the colours were formed by the aid of a Rowland grating. Tables and curves are given for five different sources of white light. Further, the correspondence of the interference colours produced in the above manner with those due to a thin air film are also tabulated.

THE first part of the report of the expedition, consisting of Dr. Tempest Anderson and Dr. J. S. Flett, that was sent out last year by the Royal Society to investigate the eruptions of the Soufrière in St. Vincent has just been published as a separate paper from the *Philosophical Transactions*. The report occupies two hundred pages, and is illustrated by eighteen fine plates representing the characteristics and effects of the eruptions. The preliminary report of the expedition was summarised in NATURE of August 21, 1902 (vol. lxxvi. p. 402).

THE dust fall recently recorded in many parts of the south of England and Wales seems to have been more extensive than was at first supposed. Information is now coming to hand to show that some parts of the Continent were also visited. In Austria (*Meteorologische Zeitschrift*, Heft ii., February, 1903) the dust fall seems to have been on quite a large scale, judging by the accounts given in the above-

mentioned journal. At Kremsmünster, for instance, dust fell both on February 22 and 23, with the wind in the west, and there was a haze described as smoke-like. In Lower Austria, at Loosdorf, on the afternoon of February 23, all the trees were covered with a yellow dust. Similar phenomena were recorded at Pyhrn (Upper Austria), at Graz and other places.

WE have received in the form of a supplement to "Wragge," January 22, 1903, a letter addressed to the people of the Australian Commonwealth by Mr. C. L. Wragge. It deals with the circumstances under which the grant for the maintenance of the observatory, established in December, 1897, through Mr. Wragge's exertions, upon the summit of Mount Kosciusko, was withdrawn. It protests against the treatment which the enterprise has received from various Government authorities, and appeals to the Australian people to take over the pecuniary obligations in connection with the maintenance and dismantling of the observatory, which have apparently been surcharged upon the director.

THE summary of the weekly weather report (appendix i.), issued by the Meteorological Council, giving the rainfall values for the whole year 1902, and the means for thirty-seven years, 1866 to 1902, shows very clearly the differences from the average in the eleven districts into which the British Islands are divided for the purposes of weather forecasts. It is seen that in only two districts, the north and west of Scotland, the rainfall exceeded the average (in the latter case to the extent of nearly seven inches). In the north-west of England the deficit was nearly nine inches, and in the south-west of England nearly eight inches; in all other districts the deficit varied from two to four inches. In the principal wheat-producing and grazing districts, and for the whole of the British Islands, the general means for the year 1902 were about three inches below the average.

FATHER BAUR, director of the Ignatius College Observatory at Valkenburg, Holland, and Father Cortie, of Stonyhurst College, have written to us with reference to the English version of Dr. Paul Bergholz's "Orkanen des fernen Ostens," revised by Dr. R. H. Scott and reviewed in NATURE of May 15, 1902 (vol. lxxvi. p. 51). They point out that Dr. Bergholz's work is itself an abridged translation of one by Father José Algué, director of the Manila Observatory, entitled "Baguios ó Ciclones Filipinos," which appeared in 1897. Dr. Bergholz acknowledges his indebtedness to Father Algué in his preface, but the relationship between the German and the Spanish books is not clearly stated, and neither our reviewer of the English edition nor meteorologists generally were aware of it. The following letter, which Dr. Scott has kindly sent us, shows that Father Algué must be given the credit for the original work:—"With reference to the work by Dr. Bergholz, I can only say that when, in March, 1900, I commenced the revision of the English version of the book, 'Hurricanes of the Far East,' to correct the German idioms in the sheets sent to me, I had not seen the work by Padre Algué, 'Baguios ó Ciclones Filipinos,' for no copy of it had reached the Meteorological Office at that date. I noticed frequent reference to the Spanish work in Dr. Bergholz's proofs, and supposed that an understanding existed between him and Padre Algué, which it appears is not the case. Dr. Bergholz, in his preface, acknowledges that he has used Padre Algué's work freely."

PROF. G. HELLMANN, of the Prussian Meteorological Institute, has recently published another rain-chart in addition to those that have already appeared. In the present instance

the region surveyed in this way is the province of Westphalia, including Waldeck, Schaumburg-Lippe, Lippe-Detmold and the neighbourhood of Rinteln. The chart, which is published by Messrs. Dietrich Reimer in Berlin, contains, besides tables, an explanatory text describing much useful information concerning the monthly and yearly rainfalls of the various districts. The mean values employed are those that have been determined from a reduction of observations extending over the ten years 1892-1901, and 201 stations have been included in the discussion. Although the period of ten years is rather short for some purposes of deduction, when it is considered that there is a secular variation of rainfall of about thirty-five years, yet Prof. Hellmann gives some interesting figures in respect to the variation of rainfall in this decade. Thus he says that for all practical purposes it can be assumed that in the province of Westphalia the yearly fall varies between 134 and 66 per cent. of the mean value, or that during the wettest year twice as much rain fell as in the driest year. From the statistics of two stations, as Gütersloh and Arnsberg, extending from 1836 and 1866 respectively, the wettest years were 1841, 1843, 1867, 1880, 1882 for the former, and 1867, 1880, 1882, 1895, 1898 for the latter. The driest years for the two places were 1847, 1857, 1865, 1874, 1885, and 1874, 1887, 1892 respectively.

Two simple lecture experiments described by Dr. Garbasso, of Turin, in the *Nuovo Cimento* are worthy of notice. One consists in arranging three Bunsen coils, of E.M.F. 1·8 volts and internal resistance 0·1 ohms, successively in series and in parallel, first with a wire of resistance 0·009 ohms, and secondly with a lamp of resistance 10 ohms. A calculation of the currents produced in the four cases is confirmed by the experimental result that the wire glows when the cells are in parallel but not when they are in series, while the lamp glows when they are in series but not when they are in parallel. The second experiment consists in showing the dynamical action between unlike parallel elements of the same current by means of a so-called "plane spiral," which consists of a wire bent so as to form branches alternately to the right and left, separated by vertical portions. When a current is passed through the wire the "spiral" becomes elongated, and that this effect is not due to heating is shown by breaking the current; if the latter has been of short duration, the spiral will resume its previous length. The spirals of Roget utilised by Róiti in his interrupter show the attractive force between elements of like parallel currents; in the present case the current elements are unlike, and they repel each other.

CONSIDERABLE uncertainty has in the past prevailed regarding the limits of combustibility of different flames as measured by the percentage of carbon dioxide and other combustion products at the instant when extinction occurs. Different writers have given numbers varying from 1·7 per cent. of carbon dioxide for a small petroleum lamp up to 14 or even 25 per cent. for a candle. A series of experiments described by MM. L. Pelet and P. Jomini in the *Moniteur scientifique* tends to throw light on the question. The combustible was in every case burnt in a bell glass, and the gases remaining analysed after extinction. The general conclusion is that the limit of combustibility is not always the same for the same substance. It depends (a) on the nature of the substance, (b) on the temperature of the flame, (c) on the quantity of combustible gas introduced into the flame per unit of time, and (d) on the temperature of the surrounding air. The first three factors, however, are dependent to a large extent on each other, especially for liquid

and solid combustibles, and it results that the chemical equilibrium between the combustibles, the oxygen and the products of combustion is a function of the temperatures alone. A practical application of the results to bath-heaters is considered.

AN article on the "Common Basis of the Theories of Microscopic Vision," contributed to the *Zeitschrift für wissenschaftliche Microscopie* by Mr. Julius Rheinberg, has been translated by the author and published in pamphlet form. The method of formation of an image by a microscope objective is considered in detail, from the point of view of the wave theory of light. By the use of carefully drawn diagrams, mathematical analysis is entirely dispensed with, while yet clear quantitative results are obtained. The general effect of a lens in altering the curvature of light waves passing through it is now generally known, but the conditions determining the resolving power of a lens might be popularised with advantage, and the pamphlet before us is well adapted to this end. Even those possessing the knowledge requisite to pursue the mathematical investigation of the subject will find it interesting and profitable to follow the author in his lucid and painstaking effort to obtain an explanation directly from first principles. Several reproductions of photographs are given, and these render the argument more effective. Those unacquainted with the wave theory will be surprised to find that, on looking through a microscope at a number of lines ruled on glass, it is possible, under suitable conditions, to see more lines than are actually in existence; so far from being true is the old adage that "seeing is believing."

WE have received two parts of the *Nat. Hist. Trans.* of Northumberland, Durham and Newcastle. In the one (vol. xii. part ii.) Mr. J. E. Robson completes the first volume of his catalogue of the Lepidoptera of the district. The second (xiv. part i.) includes a report on dredging and other marine researches undertaken by the Society in 1901. It is suggested that some of the flagellate infusorians met with in parts of the North Sea where there is no plankton may subsist on dissolved salts, like algae, and thus form the means whereby inorganic are converted into organic substances. This account is supplemented by the report on the scientific investigations carried out during 1902 under the direction of the Northumberland Sea Fisheries Committee. As regards fishing, the committee has to record an unusually successful season, and it gives an elaborate return of the number of marketable fishes captured. The report includes an account of the structural changes which take place in the common crab during the shedding of its shell, and likewise a description of its normal growth.

PROF. GRENVILLE COLE has contributed to a work entitled "Ireland: Industrial and Agricultural" an interesting sketch of the topography and geology of the country, and an account of Irish minerals and building stones.

IN a report upon the present condition of Rhodesia, presented to the Directors of the British South Africa Company (1903), Mr. J. F. Jones, C.M.G., expresses a sanguine opinion about the future of the country. There appears to be plenty of good coal, the auriferous deposits are of a "highly payable nature," while the "copper, zinc and lead deposits promise to rank among the richest in the world."

DR. A. VON KRAFFT describes the "Exotic Blocks" of Malla Johar in the Bhot Mahals of Kumaon (*Mem. Geol. Surv. India*, vol. xxxii. part iii., 1902). These blocks he attributes to volcanic outbursts, they being fragments torn from rocks *in situ*, through which the volcanic material

was forced. Many of the blocks exceed ten feet in diameter, while the smaller blocks are innumerable. Most of them are limestones, and some are sandstones, and they belong chiefly to Permo-Carboniferous, Trias, Lias and Flysch.

In the *Proceedings* of the Nova Scotian Institute of Science (vol. x. part iii., 1902) Mr. W. H. Prest, who contributes an article on drift ice, states his conclusion that the Grand Banks of Newfoundland are almost solely the products of the period of maximum ice-erosion; they are principally due to prolonged wave action on true glacial moraines, and receive very little débris from the modern polar ice. Dr. H. M. Ami describes some tracks on a slab of Devonian sandstone, evidently made by a fin or spine-like appendage, possibly of a fish. There are sundry other papers dealing with local geology and natural history.

MR. T. H. HOLLAND contributes an interesting and important article on "The Mica Deposits of India" to the *Memoirs* of the Geological Survey (vol. xxxiv. part ii., Calcutta, 1902). He discusses the mineralogical and chemical characters, the geological occurrence and distribution, the uses of mica, and the mining practice. Crystals or "books" of muscovite-mica have been obtained in Nellore district, measuring ten feet across the basal planes, but usually they are much smaller. This mica occurs in granite-pegmatite, and being the most delicate mineral in the rock, it is the first to show the effects of crushing earth-movements, so that large quantities of valuable mineral have been destroyed; but the author observes it is on account of the remarkable stability of the Indian Peninsula, the geologically long and perfect quiescence it has enjoyed, that India is able to boast of the finest mica deposits in the world.

WE have received the annual report for 1901 of the Iowa Geological Survey, with accompanying papers. Mr. Samuel Calvin, the State Geologist, refers to the fact that the succession of events during the Glacial epoch is more clearly recorded in Iowa than elsewhere in America. Five Glacial and four inter-Glacial stages are recognised. He refers also to the subject of petroleum and natural gas, which occupy a large share of public attention; and remarks that it was not until the Trenton period of the Ordovician that life existed in such profusion as to furnish organic matter in sufficient amount to give rise to considerable quantities of gas or oil. Of succeeding formations those of Carboniferous, Cretaceous and Tertiary age are the most prolific in oil and gas. Statistics of the mineral production of Iowa for 1901 are contributed by Mr. S. W. Beyer. The geology of Webster county is dealt with by Mr. F. A. Wilder, who gives a particular account of the gypsum industry in Iowa, and a chapter on that of Germany. In Iowa, gypsum available for economic purposes is said to occur over at least forty square miles, and the average thickness of the mineral suitable for plaster is ten feet. Mr. T. E. Savage, who describes Webster county, gives particulars of the Carboniferous Limestone fauna, a subject also dealt with by Mr. J. A. Udden in reference to Jefferson county, and by Mr. A. G. Leonard in describing Wapello county. In Cherokee and Buena Vista counties the Pleistocene deposits and those of recent age occupy the entire region, and they are described by Mr. T. H. Macbride. The volume is well illustrated with maps, diagrams and pictorial views.

THE *Indian Monthly Weather Review* for July of last year gives an interesting account of some severe earthquake shocks which were experienced at Bunder Abbas, in the Persian Gulf, on July 9, 13, 18 and 20, of which the follow-

ing is an abstract. The first shock, which was felt on July 9, was preceded by a strange rumbling noise, like thunder or the roar of big guns away out at sea, proceeding from the direction of the island of Kishm. The people in Bunder Abbas, astonished and alarmed, rushed from their houses and looked towards the island from which the noise seemed to come. Suddenly the first shock was felt, and this brought down a house in the vicinity of the bazaar with a crash, nearly killing a passer-by. The shocks were almost continuous, and kept the buildings in motion for nearly two minutes; they brought down some big boulders from the Portuguese fort, in which the governor resides, and these in turn unroofed the adjoining Customs Office. The tall buildings and wind towers either collapsed or remained in dangerous conditions. At Socr suburb, distant two and a half miles, the ground opened and water poured in. Most of the buildings were destroyed and several lives lost. Information from Kishm recorded the total destruction of most of the houses, but no loss of life. In Ormuz part of an old fortress collapsed, and slight shocks were felt at Minan, forty miles away. The earthquake was felt also on the hills behind the town of Bunder Abbas, and a cloud of dust obscured everything. On July 13, 18 and 20 more shocks were felt, all of which brought down numerous buildings, and after that the shocks continued almost daily. It is stated that there was not a building in Bunder Abbas which had not suffered. The bazaars and shops were closed and provisions difficult to obtain. Houses were abandoned, and everybody encamped in huts on the Maidan behind the town, at Naiband, or on the coast.

THE thirty-third annual report shows that the Wellington College Natural Science Society continues to flourish. The meteorological report for 1902 is a useful and instructive record, and the abstracts of lectures delivered before the Society show that interest is taken in the progress of knowledge.

THE sixteenth annual issue of the "School Calendar" has been published by Messrs. Whittaker and Co. at 1s. net. It contains complete and up-to-date particulars of available scholarships at the universities and colleges of Great Britain, in addition to other information likely to be of assistance to persons engaged in educational work.

THE Home Office has issued a set of tables relating to the output of coal and other minerals, and the number of persons employed during the year 1902 at mines under the Coal and Metalliferous Mines Regulation Acts. It is noteworthy that the output of coal, which was 219,037,240 tons in 1901, was 227,178,140 tons in 1902, showing an increase of 8,140,900 tons.

THE sixty-third volume, being that for 1902, of the *Journal* of the Royal Agricultural Society of England, has now been published by Mr. John Murray. Among the special articles of interest are those by Mr. Cecil Warburton, on orchard and bush-fruit pests and how to combat them; and by Dr. N. H. J. Miller, on the experiments at Rothamsted on the changes in the composition of mangels during storage. The official reports, which form the second part of the volume, include one by Dr. J. A. Voelcker, describing the field, the feeding and the pot-culture experiments at the Woburn experimental station of the Royal Agricultural Society. The third part of the volume contains, with much other important information, a summary by the editor of the recent evidence as to the identity of human and bovine tuberculosis, and reviews by Mr. W. Carruthers, F.R.S., of new works on agricultural botany, and by Dr. H. B. Woodward, F.R.S., of a work on agricultural geology.

THE additions to the Zoological Society's Gardens during the past week include two Magellanic Foxes (*Canis magellanicus*) from South America, presented by Baron Adolp Ott; a European Pond Tortoise (*Emys orbicularis*), European, presented by Mr. E. A. Hambro; two Smooth-headed Capuchins (*Cebus monachus*) from South-east Brazil, a Negro Tamarin (*Midas ursulus*) from Guiana, two Grant's Zebras (*Equus granti*) from North-east Africa, four Hutchin's Geese (*Bernicla hutchinsi*) from Arctic America, six Dark-green Snakes (*Zamenis gemonensis*), two Lacertine Snakes (*Coelphelis monspessulana*), a Vivacious Snake (*Tarbophis fallax*), European, deposited.

OUR ASTRONOMICAL COLUMN.

NEW SPECTROSCOPIC BINARIES.—In a paper communicated to the Astronomical and Astrophysical Society of America Profs. Frost and Adams announce the discovery of six stars of the Orion type having variable radial velocities, and two or three stars of the same type which are supposed to be spectroscopic binaries.

Of the former, δ Ceti shows a range of velocity from +6 to +16 km. per second, and its period is short; the velocity of ζ Tauri has a range of +7 to +34 km. per second, and a probable period of about fourteen days; the spectrum of this star is rather peculiar, in that the hydrogen lines β and γ are sharp and strong, whilst the other lines (some of them metallic) are faint. In the case of ν Eridani a variation in the velocity of +3 to +26 km per second is indicated.

Two or three other stars of the Orion type are suspected of having variable radial velocities, but the facts are not yet fully established. The proportion of spectroscopic binaries found amongst the stars of this type which have hitherto been examined is 1 : 5 (*Science*, n.s., vol. xvii. No. 426).

THE SPECTRUM OF COMET 1902 b.—In a communication to the *March Bulletin de la Société de France*, M. de la Baume Pluvinel discusses the spectra of comet 1902 b, which he has obtained, using a prism of $20^\circ 18'$, mounted in front of an objective the focal length of which was four times its aperture.

In a spectrum obtained on October 24, with one hour's exposure, the positions of fifteen condensations (i.e. images of the comet) were found to be measurable; the spectrum of Vega was photographed on both sides of the cometary spectrum as a comparison.

Two condensations at $\lambda 472$ and $\lambda 389$ respectively were found to be by far the strongest, these radiations evidently accounting for almost all the actinic light emitted by the comet, and, therefore, in photographing such objects it would be advisable to use an objective which brings these two radiations to the focus simultaneously.

Of the other condensations measured, the most important one extends from $\lambda 409.2$ to $\lambda 400.0$, and was far more intense on a negative obtained on October 13, when the comet was at a greater distance from the sun, than on the one obtained on October 24.

The conclusion arrived at from the detailed examination and discussion of the spectrum is that in the light emitted by this comet occur (1) the chief radiations emitted by carbon in the electric arc, viz. $\lambda 564$, $\lambda 518$ and $\lambda 472$ belonging to the spectrum of hydrocarbons, and $\lambda 389$ belonging to the cyanogen (?) spectrum; (2) the radiation $\lambda 431.2$, which appears in the flame spectra of the hydrocarbons; and (3) a group of radiations, $\lambda 409.2$ to $\lambda 400.0$, which corresponds to no carbon group.

MISSING ASTEROIDS.—In *Circular* No. 69 of the Harvard College Observatory Prof. E. C. Pickering directs attention to the fact that of the five hundred minor planets already discovered, sixty-eight have not been observed for the last five years, and the last observations of about twenty-five of them were made from ten to thirty years ago. He then proceeds to point out the danger that may arise from allow-

ing these objects to remain unobserved, and their elements and ephemerides uncomputed, for an observer can never be certain whether the object he is observing is a new discovery or not, and so might pass over such an object as Eros, supposing it to be one which had been recorded previously.

Prof. Pickering concludes that it is a much more important work to rediscover all those minor planets previously recorded and determine their elements than to go on adding to the list by the discovery of new ones. Acting on this conclusion the Harvard observers prepared a list of all the asteroids, brighter than the eleventh magnitude, which have not been observed during the last five years, and have already photographed (21) Lutetia and (22) Kalliope (on plates obtained on January 21 and 22), which were last observed in 1897 and 1896 respectively, and they find that the error of the ephemeris given for the latter is large enough to render the finding of this object a difficult matter.

A RICH NEBULOUS REGION IN THE CONSTELLATION LYNX.—Whilst pursuing a photographic search for the minor planet (475) Occlo with the Bruce telescope, Prof. Max Wolf has discovered from his plates a region situated on the borders of Ursa Major and the Lynx which is especially rich in small nebulous patches. One particularly dense region is about the point $\alpha=8h. 2m., \delta=+46^\circ 5'$ (1855), the centre lying between the two stars B.D.+48°.1366 (8'5m.) and B.D.+48°.1368 (8'4m.), where, in a circle having a radius of thirty minutes of arc, he was able to count at least forty small faint nebulae.

Two of the nebulae, having the positions $\alpha=8h. 3'0m., \delta=+46^\circ 25'$ and $\alpha=8h. 3'7m., \delta=+46^\circ 9'$ respectively, are worthy of particular notice. The first was observed by W. Herschel, and appears in his catalogue as iv.,55. It is bright, apparently round, has a diameter of about $1'$ and several condensations, and should appear as a beautiful object in a large reflector.

So far as Prof. Wolf is aware, the second has hitherto not been recorded. It has a length of about 3.5 minutes of arc, is rectilinear and very narrow, and is moderately bright. It includes in its northern boundary a faint star the position angle of which is 350° , and lies about $1'$ west of the star B.D.+46°.1371 (9'3m.) (*Astronomische Nachrichten*, No. 3847).

THE BIRDS OF BEMPTON CLIFFS.

A VERY interesting and beautifully illustrated account of the birds frequenting the chalk cliffs of Bempton, Yorkshire, and of the egg industry carried on by the natives, appears in part i. of the *Transactions of the Hull*

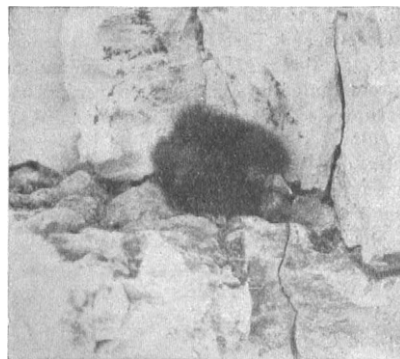


FIG. 1.—Newly-hatched Puffin. (From the "Birds of Bempton Cliffs.")

Scientific and Field Naturalists' Club. The author, Mr. E. W. Wade, commences by waxing enthusiastic over the wonderful sight presented by these precipitous cliffs when they are visited, in spring and summer, by swarms of sea-birds, among which guillemots are now predominant. In